

Chapter 6 – Fish Sampling

The methods for sampling fish populations presented in this chapter are specific to the Michigan Department of Natural Resources Stream Status and Trends Program. Chapters beginning a fish sampling program outside of Michigan should contact pertinent local agencies for guidance on specific techniques. It is important to make sure you are collecting data in a way that will allow local agencies to utilize it. For example, the MI DNR wants fish length data presented to them based on the number of fish per inch group. Therefore, we will present the data in this way; however, we plan to record fish length to the nearest 0.1 inch. This is an example of a way in which protocols may need to be modified to meet the needs of local agencies.

6.1 Justification

Harvest regulations on coldwater fishers are one of the primary tools managers' possess to help enhance these fisheries. Basic information (density, density variability, growth rate, and age-specific mortality schedule) about the fish population in a stream is required to ensure appropriate regulations are in place. Generally, this would require that a fish population survey be done in a given stream at least once, but preferably 2-3 years in a row. The MI DNR conducts this type of survey; however, they conduct surveys on a randomized basis to ensure statewide coverage. Therefore, due to the large number of coldwater fisheries in Michigan, an individual stream likely only gets sampled about once a decade. The result is that we lack information to assess whether regulations are appropriate or effective for a large percentage of coldwater fisheries in MI. With a shrinking state budget the MI DNR lacks the ability to increase its overall effort in sampling fish population. Volunteers can help to fill the gap by conducting population estimates and species surveys in coldwater streams.

6.2 Objectives

These standard protocols for fish sampling are intended to be used to increase the amount of fisheries data available for Michigan's coldwater streams. This document is designed to provide standard protocols for conducting fish population surveys and surveys of fish species, size, and age that can be used by trained volunteers participating in the *River Stewards Program*.

These fish sampling standard protocols are designed to address several objectives:

- Increase the amount of available fisheries population data for coldwater streams in MI.
- Increase the amount of available species, age, and size distribution data for coldwater streams in MI, especially in streams that have not been sampled in 30 plus years.
- Provide consistent, rigorous, and safe methods for the sampling of fish in coldwater streams in MI by MITU volunteers. All procedures follow MI DNRE Stream Status and Trends Program Sampling Protocols.

6.3 Training

Any chapter that would like to sample fish must have at least one member who has been through fish sampling training with a MITU staff person. This includes training on identifying non-game fish, how to photograph an unknown species for later identification, and electrofishing safety. Please contact a MITU staff person for further information.

If a chapter would like to sample fish but does not own a backpack electrofisher, they may use the MITU backpack electrofisher. However, a MITU staff member must be present when sampling is being conducted with the MITU backpack electrofisher. Sampling should be scheduled through the MITU Aquatic Ecologist.

Safety is of the utmost concern when using electricity to sample fish populations. At least one CPR/First Aid certified individual must be present at EVERY sampling event.

6.4 Equipment

- Backpack electrofisher
- Nets with non-conducting handles
- Gloves specifically designed for electrofishing
- Measuring board
 - Measuring board that can be worn around the waist
- Buckets
- Coolers
- Polarized sunglasses
- Fish identification guide
- Digital camera
- Waders
 - If you are using breathable waders make sure to wear long pants underneath to help prevent shocks.
 - Non-breathable or neoprene waders will work well.
- Data sheets
- Pencils
- Handheld GPS
- Handheld thermometer
- Yard stick

6.5 Preparation

a. Communicate with area Fisheries Biologist

It is very important that you, or a MITU staff person, talk with your area fisheries biologist before making plans to begin a fish monitoring program. We are trying to collect data that will be useful to DNRE biologists; therefore, communication is essential.

We need to determine what type of survey the biologist would like the chapter to do (population estimate or one-pass) and what streams in their area are priorities.

b. Site Selection

After we have talked with the area fish biologist about priority sites we can choose which priority sites we would like to sample and where in those stream sampling will take place. It is important to determine where sampling will take place early on so MITU staff can apply for a collectors permit. MITU staff will help with site selection.

c. Collectors Permit

A chapter representative or a MITU staff person can apply for a collectors permit for your chapter. If a MITU staff person applies, but will not be present for all shocking events, it is necessary for a chapter representative who will be present to also be on the application. A person listed on the collectors permit must ALWAYS be present when sampling is being conducted. You must know where you will be sampling before you can apply for a permit. Permit applications can be submitted online or printed, filled out, and mailed in. Permit applications are available at:

<http://www.michigan.gov/dnr/0,1607,7-153-10364-35079--,00.html> .

In order for MITU to maintain a good working relationship with the MI DNRE, it is very important we NEVER sample without a permit, that we ALWAYS have a copy of the permit with us when sampling, and that an individual listed on the permit is ALWAYS present during sampling. It is also very important that you contact your area Conservation Officer about a week before each sampling event to let them know where, when, and how you will be sampling. This can prevent unnecessary travel by Conservation Officers and an inconvenience to you while sampling. If a Conservation Officer does stop and inquire about what you are doing let them know what you are up to and show them your permit. A list of Conservation Officers can be found at:

<http://www.michigan.gov/dnr/0,1607,7-153-42199-24666--,00.html>.

6.6 Fish Sampling Methods

There are two different types of fish surveys outlined in this document. There are methods for a fisheries population estimate and methods for a survey that does not estimate population, but looks at species, age, and size distribution. Each chapter should consult with their area Fisheries Biologist when deciding which type of survey will work best in their area.

6.7 Population Estimates

Sampling should be conducted between August 1 and October 15, but preferably between August 15 and September 15.

a. Data Sheets

On SURVEY INFORMATION form:

- Stream Survey Details - Record GPS coordinates of station boundaries and the half-way point, in decimal degrees to five places past the decimal point. Check the box that says “Fixed site marking and recapture run” as the purpose.
- Effort Details – Record the type of electrofisher used and the number of probes.
- We will not be using blocknets at this time.

b. Sampling Methods

Day 1 will be the marking run, Day 2 will be the recapture run. Mark all trout species.

Before you begin shocking:

- Make sure you know where the starting and ending points are.
- Fill 3-4 cooler about half-way with stream water if you do not have a measuring board that can be worn around the waist (belly board)
 - If you have a belly board you will not need coolers
- Assign tasks to volunteers
 - One person to run the electrofisher
 - Two to three people to net fish
 - One to two people to collect netted fish in buckets
 - One person to transport fish from buckets to cooler
 - If there are sufficient volunteers – two to three people to identify, count, measure, and mark fish

Measuring, identifying, and marking fish

Begin shocking in an upstream direction, so shocked fish flow into your nets. Make sure to shock the entire stream bottom and areas that look like prime habitat. As you collect fish place them in the cooler for storage until they can be processed.

If you have a “Belly Board” – The volunteer who will be measuring and marking the fish should put on the “Belly Board”. All fish that are shocked should be transferred to buckets containing fresh stream water. Fish should go straight from the buckets onto the “Belly Board” to be identified, measured, and marked. You may have more than one volunteer working on identification.

It is important that the individual wearing the “Belly Board” follow at least 50 feet behind the shocking team so that released fish are not recaptured.

If you do not have a “Belly Board” - Coolers should be filled with stream water. Make sure to keep the lids closed to keep the water as cool as possible. If you do not have bubblers in your coolers, make sure to put fresh stream water into the coolers ever 10-15 minutes. If trout begin to rise to the top it is a sign they are running out of air. If this

happens change the water in the cooler and measure, mark, and release the fish. Trout should not be left in the coolers for more than about 30-40 minutes.

Put all of the fish you shock into the coolers as you go. If you have enough volunteers, two to three can begin processing fish as they are caught. If you do not have sufficient volunteers to have two people work on identifying and marking fish, place fish in the coolers until they are full or 30 minutes has passed. At that point mark your place in the stream and stop to process the fish. Non-trout should be released below the downstream end of the study section. Marked trout should be released in the lower half the stream section, but not right at the bottom.

If you have to stop in the middle to process fish, make sure to mark your place in the stream so you know where to continue shocking.

Identifying and Marking Fish

Identify every fish you can. If you are unsure about the identify of a fish take several digital images of the fish and count it as “unknown 1”, count all fish of the same species as “unknown 1”. Count subsequent new species of unknown fish as unknown 2, unknown 3, etc. and be sure to take several digital photographs.

Mark all trout. The easiest method for marking is a fin clip. Consistently mark all trout with a fin clip. Snip the fin perpendicular to the fin rays so it is clear the fish has been marked. Clip off a small, but noticeable, piece of the **top** of the tail fin during the marking run (day one) and a small, but noticeable, piece of the **bottom** of the tail during the recapture run (day two). Clipping a different part of the tail each day allows recaptured fish to be identified on day one and day two. If a fish is recaptured within the same day do not count the fish the second time it is captured, we do not want to double count fish, this will cause inaccuracy in the population estimate.

Record the species and length of all fishes. Note the appearance of new species on the recapture run, but do not include them with quantitative data collected from the first pass.

Measure and take scale samples from 10 trout in each inch class for trout 4 inches or larger. Record the length of the scale sampled fish to the nearest tenth of an inch.

When you have finished shocking the study reach process fish as described above. Avoid releasing marked fish in the upper one-half of the survey area to minimize the numbers of fish migrating out of the station prior to the recapture run.

Record the amount of time spent shocking (this can be found in seconds on the electrofishing unit).

Recapture

On day two electrofish the same stream reach as day one. Collect all fish making note of any species you did not see on day one, you do not have to count or measure these fish,

just note their presence. Place captured trout and new species into coolers, filled with stream water, or into buckets to be measured immediately on a “Belly Board”. Put fresh stream water into coolers every 10 to 15 minutes.

Each trout needs to be measured and examined for a mark. Record the length and if the fish has a mark or not on the RECAPTURE RUN data sheet. Also, mark each trout captured on the recapture run by clipping off a small piece from the bottom of the tail fin. Release trout at the bottom of the study reach or as they are worked up if a “Belly Board” is being used (make sure the individual wearing the “Belly Board” is following at least 50 feet behind the shocking team).

Keep track of the number of trout collected with and without marks on the RECAPTURE RUN data sheet. You only need to pay attention to trout and new species on day two.

Do not include new species collected during the recapture run on the data sheet from day one. Simply note their presence on the RECAPTURE RUN data sheet.

Record the amount of time spent shocking (this can be found in seconds on the electrofishing unit).

6.8 Random Site Protocols

a. Determining Sampling Location

A chapter member or a MITU staff member should contact the area Fisheries Biologist to obtain a list of priority streams. Based on this list we will identify road-stream crossing or other access points for sampling on the priority streams. If road-stream crossings and public access points are not available chapter representative should contact land owners to obtain permission to access and survey the stream.

b. Sampling Protocols

Try to schedule fisheries surveys between June 15 and September 15, but preferably between July 15 and August 30.

On the SURVEY INFORMATION form:

- Stream survey details – check the box for “Random site one-pass” as the purpose.
- Effort details – Record the type of electrofisher used and the number of probes.

c. Fish Survey Protocols

Always sample in an upstream direction. The recommended lengths of stream to be surveyed based on stream size are as follows:

- Small streams <15 feet wide – 500 feet
- Small streams >15 feet wide – 800 feet
- Medium streams – 1200 feet

Before you begin shocking:

- Make sure you know where your starting and ending points are.
- Fill 3-4 coolers about half-way with stream water and close the lids
- Assign tasks to volunteers
 - One person to run electrofisher
 - Two to three people to net fish
 - One to two people to collect netted fish in buckets
 - One person to transport fish from buckets to coolers
 - If you have enough volunteers – two to three people to identify and measure fish

Begin shocking in an upstream direction, so shocked fish flow into your nets. Make sure to shock areas that look like “prime habitat” well. As you collect fish place them in the coolers for storage until they can be processed. Fish less than 1 inch long can be ignored.

Coolers should be filled with stream water. Make sure to keep the lids closed to keep the water as cool as possible. If you do not have bubblers in your coolers, make sure to put fresh stream water into the coolers ever 10-15 minutes. If trout begin to rise to the top it is a sign they are running out of air. If this happens change the water in the cooler and measure and release the fish. Trout should not be left in the coolers for more than about 30-40 minutes.

Put all of the fish you shock into the coolers as you go. If you have enough volunteers, two to three can begin processing fish as they are caught. If you do not have sufficient volunteers to have two people work on identifying and counting fish, place fish in the coolers until they are full or 30 minutes has passed. At that point mark your place and stop to process the fish. Release the fish at the bottom of the stream section to minimize the chance of recapturing individuals.

If you have to stop in the middle to process fish, make sure to mark your place in the stream so you know where to continue shocking.

Identifying and Measuring Fish

Measure and count all fishes.

Identify every fish you can. If you have unsure about the identify of a fish take several digital images of the fish and count it as “unknown 1”, count all fish of the same species as “unknown 1”. Count subsequent new species of unknown fish as unknown 2, unknown 3, etc. and be sure to take several digital photographs.

Collect scale samples for 10 fish per inch group for salmonid species.

Record the amount of time spent shocking (this can be found in seconds on the electrofishing unit).

6.9 Habitat Data

When you are finished sampling fish fill in the “Stream Habitat Observations” datasheet. Fill in as much of the sheet as you can with the equipment available. Variables to be recorded on this data sheet include: air and water temperature, average stream width, average and maximum depth, substrate composition, channel morphology, and amount and type of fish cover. Describe water level as low, normal, or high. Water clarity should be described with poor, average, good. A description of color and turbidity can also be included here. Estimate substrate composition and channel morphology for the entire stream section. Electrofishing efficiency should be described as poor, average, good.

This datasheet should be completed after each fish sampling event.

6.10 Data

Completed data sheets should be given to MITU staff. If a MITU staff person is present at the sampling event that person will take the data sheets when sampling is completed. If no MITU staff person is present, mail data sheets to MITU:

Michigan Trout Unlimited
P.O. Box 442
Dewitt, MI 48820

MITU will put the data into the format desired by the MI DNRE and send it in. MITU will also prepare a report for the chapter summarizing the findings.


Appendix 6A - Electrofishing Tips and Techniques

Electrofishing Tips and Techniques

- It is a good idea to test the electrofisher before sampling begins.
 - Ideally this should be done a day or two before the sampling event occurs.
 - Two or more people should take the electrofisher to a stream and make sure fish are being stunned when the electricity is turned on.
 - If fish are not being stunned the power needs to be adjusted, refer to your electrofisher handbook for recommendations of settings.
- All crew members must wear polarized sunglasses to help them see stunned fish and to help improve visibility of the stream bottom to reduce tripping
- Begin at the downstream end of the site and work in an upstream
- Every fish is important
 - Everyone is biased towards netting large fish. Your eye naturally goes to the bigger fish. It is important to consciously try to look for small fish. Seeking out small fish can help minimize bias towards catching big fish that catch your eye.
- Make sure to sample all habitat features and the entire stream bottom
 - Think of it like you are vacuuming the streambed and must pass over the entire streambed – moving from one shoreline to the other in a zigzag pattern works well.
- When sampling undercut banks and complex habitat structures (log jams etc.) it often works well to put the probe all the way under the bank or into the structure before turning on the electricity, then pull the probe out in a sweeping motion so the fish follow.
- In riffles and fast moving water, it works well to have the netters positioned downstream of the person operating the shocker with their nets in the water to allow fish to flow into the net.
- It is a good idea to leave the net in the water in fast moving water even if you don't see any fish as they can be hard to see when they are quickly floating downstream, especially sculpin, and other benthic fish, which travel near the bottom.

Appendix 6C – MI DNR Fish Collection Datasheets

FISH COLLECTION: SURVEY INFORMATION (reduced to fit on this page).

	Stream Status and Trends Program Fish collection	Survey information Page 1 <small>Revised 3/22/04</small>
Stream survey details:		
Begin date: _____ End date: _____ GPS ¹ : Upstream Middle Downstream Water body: _____ Lat: _____ Station: _____ Long: _____ VSEC I.D. _____ County: _____ T. _____ R. _____ Sec. _____ Station description ² (describe or map on back of sheet): _____ <hr/> Purpose: Fixed site marking and recapture run <input type="checkbox"/> Random site one pass <input type="checkbox"/> Other (explain): _____ <hr/> Check if station is inaccessible: <input type="checkbox"/> Check if station is intermittent/dry: <input type="checkbox"/> Check if station has Great Lakes access: <input type="checkbox"/> Has station been stocked w/in last 5 years? Yes <input type="checkbox"/> No <input type="checkbox"/> If yes, indicate species: _____ Crew (first initial, last name): _____		
Effort details:		
Effort number: _____ Beginning date: _____ Time: _____ Ending date: _____ Time: _____ Effort number: _____ Beginning date: _____ Time: _____ Ending date: _____ Time: _____ Gear: Boomshocker <input type="checkbox"/> Backpack <input type="checkbox"/> Barge <input type="checkbox"/> EF Unit I.D. no. _____ Station length ³ (ft): _____ Station width (ft): _____ Acres: _____ Check if block nets were used ⁴ : <input type="checkbox"/>		
Gear notes:		
No. of anodes: _____ Volts: _____ Duty cycle: _____ Pulse: _____ Notes: _____ <hr/>		
Sampling conditions:		
Water temp (°F): _____ Air temp (°F): _____ Time of temperature recording: _____ AM <input type="checkbox"/> PM <input type="checkbox"/> Conductivity (µs/cm): _____ Notes: _____ Electrofishing efficiency: Low <input type="checkbox"/> Med. <input type="checkbox"/> High <input type="checkbox"/> Water level: Very high <input type="checkbox"/> High <input type="checkbox"/> Avg. <input type="checkbox"/> Low <input type="checkbox"/> Very Low <input type="checkbox"/> Weather: Clear <input type="checkbox"/> P. Cloudy <input type="checkbox"/> Overcast <input type="checkbox"/> Rain <input type="checkbox"/> Water color: Clear <input type="checkbox"/> Gry <input type="checkbox"/> Brn <input type="checkbox"/> Blk <input type="checkbox"/> Green <input type="checkbox"/>		
<p>¹ Record GPS coordinates in decimal degrees to 5 decimal places. ² Include access point with reference to nearest road or highway. ³ Fixed sites: Use lengths of pre-existing long-term pop'n estimate stations if they exist. Otherwise, station lengths are 1000'. Random sites: Sm. stream <15' wide=500', >15' wide=800'; med. stream=1200'; lg. stream=1500', very lg. stream=boomshock for 1 mile. ⁴ Fixed sites: Block nets are optional, but should be used consistently.</p>		



Stream Status and Trends Program
Fish collection

Survey information
Page 2
Revised 3/22/04

Water body and station: _____ Begin date: _____ End date: _____

Site assessment data: *The purpose of this section is to provide a **rapid** assessment of on-site conditions... devote time accordingly.*

Physical appearance:	Upstream of section midpoint (Check all that apply)				Downstream of section midpoint (Check all that apply)			
	Abundant <input type="checkbox"/>	Moderate <input type="checkbox"/>	Sparse <input type="checkbox"/>	Absent <input type="checkbox"/>	Abundant <input type="checkbox"/>	Moderate <input type="checkbox"/>	Sparse <input type="checkbox"/>	Absent <input type="checkbox"/>
Invertebrates ⁵	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Floating algae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Filamentous algae	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Turbidity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Oil sheen	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Foam	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Trash	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments (presence of crayfish, minnows):								

Instream cover:	Upstream of section midpoint (Check all that apply)				Downstream of section midpoint (Check all that apply)			
	Abundant <input type="checkbox"/>	Moderate <input type="checkbox"/>	Sparse <input type="checkbox"/>	Absent <input type="checkbox"/>	Abundant <input type="checkbox"/>	Moderate <input type="checkbox"/>	Sparse <input type="checkbox"/>	Absent <input type="checkbox"/>
Undercut banks	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Overhanging vegetation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Deep pools	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Boulders	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Aquatic plants	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Logs/woody debris	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Comments:								

Notes, maps, or additional comments:

⁵Note invertebrate abundance on hard surface (such as rock or wood).

Stream Habitat Observation for CLMMU Small-Stream Surveys

Water body: _____ Station: _____ Date:

Crew:

—

Current Weather: _____ Preceding Weather:

Air Temperature: _____ @ _____ am/pm Water Temperature:
_____ @ _____ am/pm

Length of station: _____ Average stream width:

Depth range: _____ Maximum depth: _____

Water level: _____

Water clarity: _____

Substrate composition:

_____ % silt
_____ % sand
_____ % gravel
_____ % cobble
_____ % boulder

Stream channel morphology:

_____ % pool
_____ % run
_____ % riffle

Electrofishing efficiency: _____

Presence and type of fish cover: _____

Other comments